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- **Launch (approx.) late 2025**
- **Commissioning** is ~450hr during cruise and settling into L2 orbit.
 - Instrument checkouts and some initial calibrations
- **Tech Demo** is ~3 months of observing in first **1.5 years** of mission.
 - This phase is *guaranteed*.
 - *Must* demonstrate all instrument requirements.
 - *May* have additional observations to show science capability.
- *If successful*, **1 year Participating Science Program**
 - **Shared time w/ WFI**
- *If successful*, follow-on **2.5 year science program**
 - **Shared time w/ WFI**
- Potential for extended mission for years 5-10?
 - Starshade & other potential additions

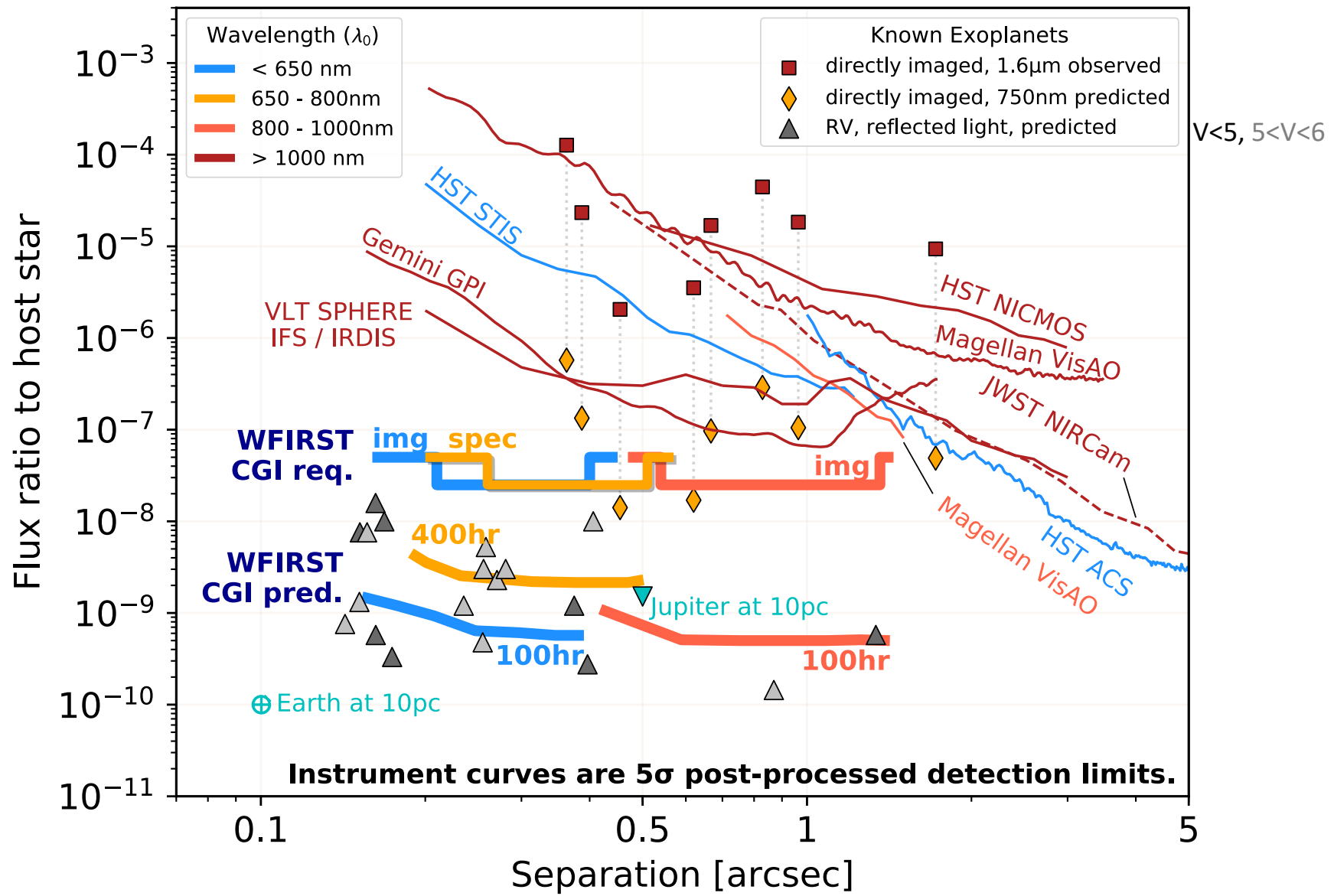
CGI Observing Modes

CGI Filter	λ_{center} (nm)	BW	Channel	Mask Type	Working Angle	Can use w/ linear polarizers	Starlight Suppression Region
1	575	10%	Imager	HLC	3-9 λ/D	Y	360°
3	730	15%	IFS	SPC bowtie	3-9 λ/D		130°
4	825	10%	Imager	SPC wide FOV	6.5-20 λ/D	Y	360°

These three “official” modes will be fully tested prior to launch and will be utilized during the formal tech demonstration. Flight hardware is configurable with other filter and coronagraph combinations that will be characterized on engineering testbeds, but will not be fully tested prior to launch.

$\lambda_1=575$ nm, 10% $\lambda_2=660$ nm, 18% $\lambda_3=730$ nm, 15% $\lambda_4=825$ nm, 10%

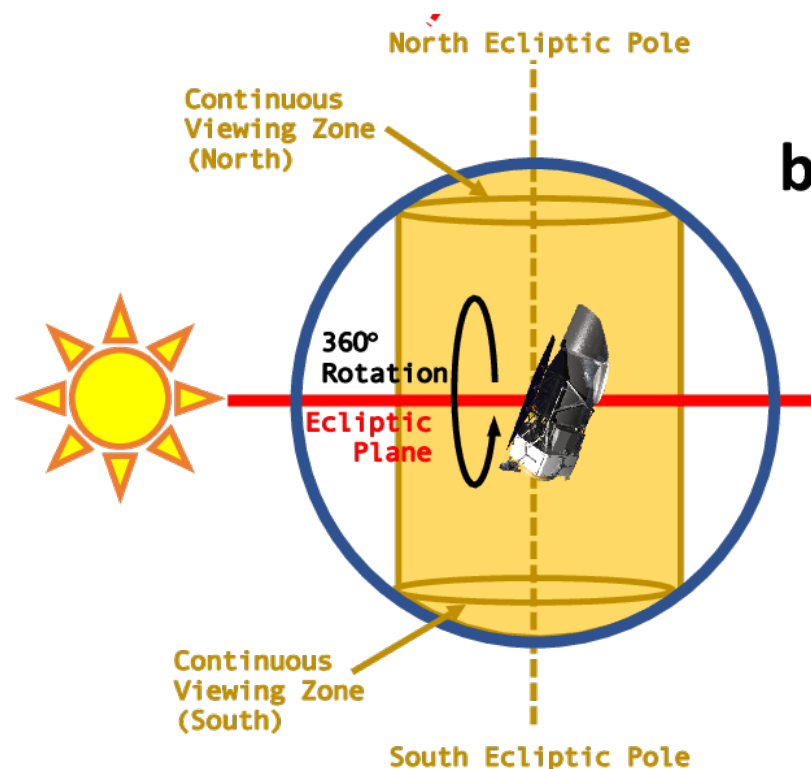
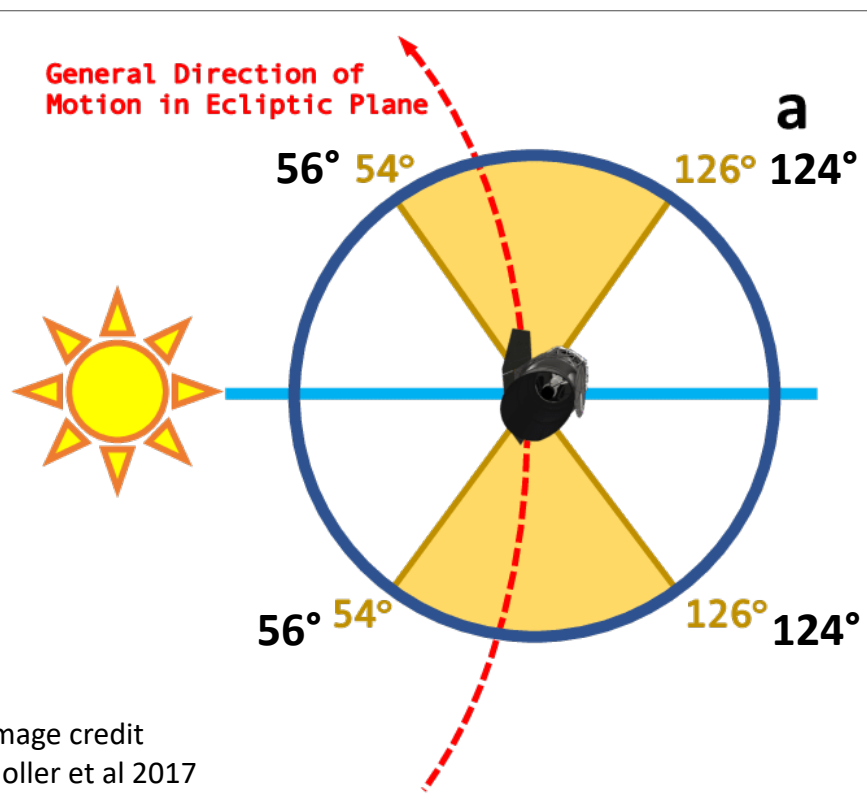
Required & Predicted CGI Performance



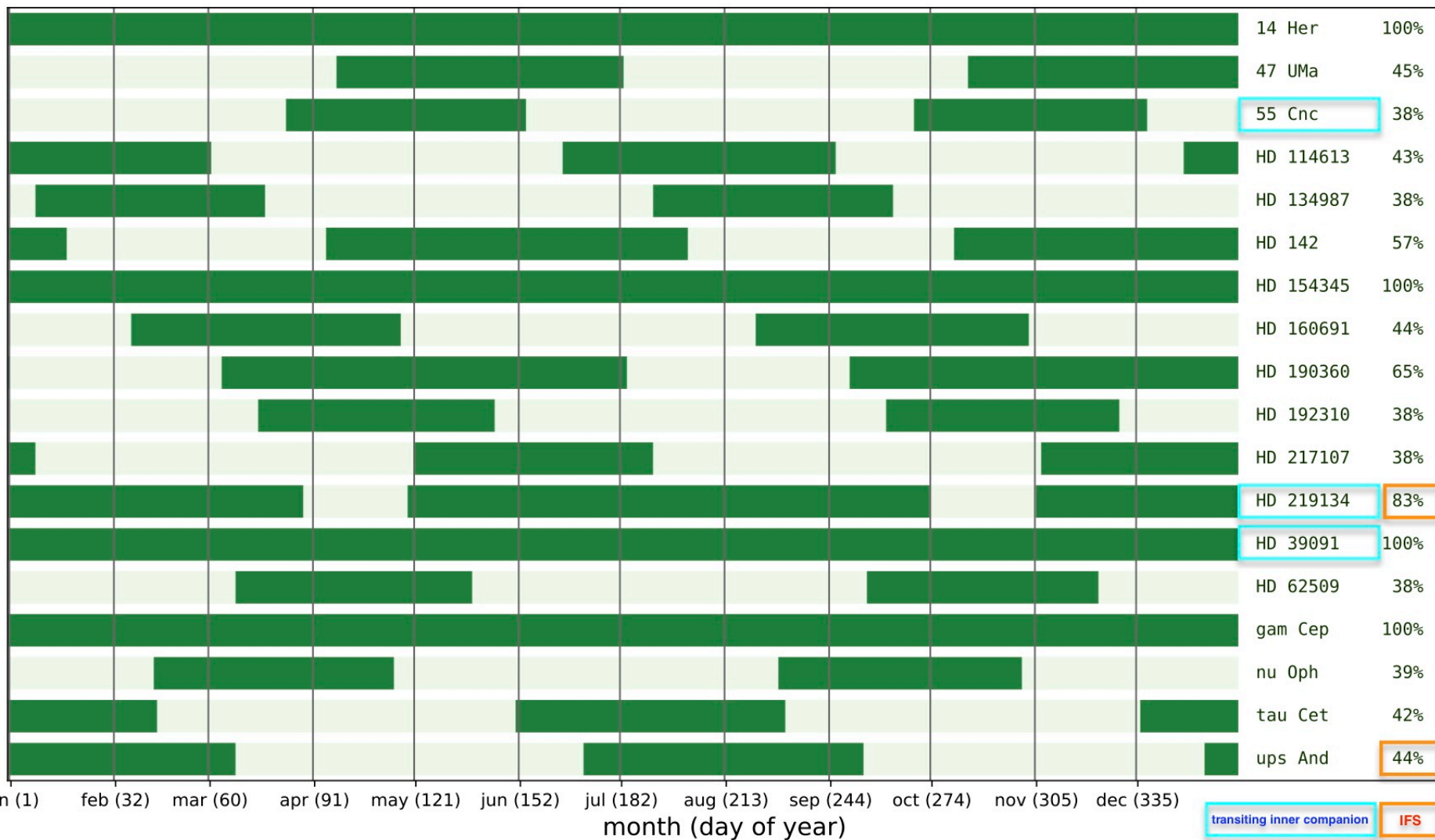
- i. Band 1 point source imaging in narrow FOV mode.
 - i. 2 additional revisits
- ii. Band 3 IFS of a point source.
- iii. Band 4 imaging of a faint disk in wide FOV mode.
 - i. 1-2 additional revisits
- iv. Polarimetry of a bright source in Bands 1 & 4.
- v. Astrometry of a point source.
- vi. Record telemetry.
- vii. Upload new wavefront control algorithm

CGI sun angle constraint

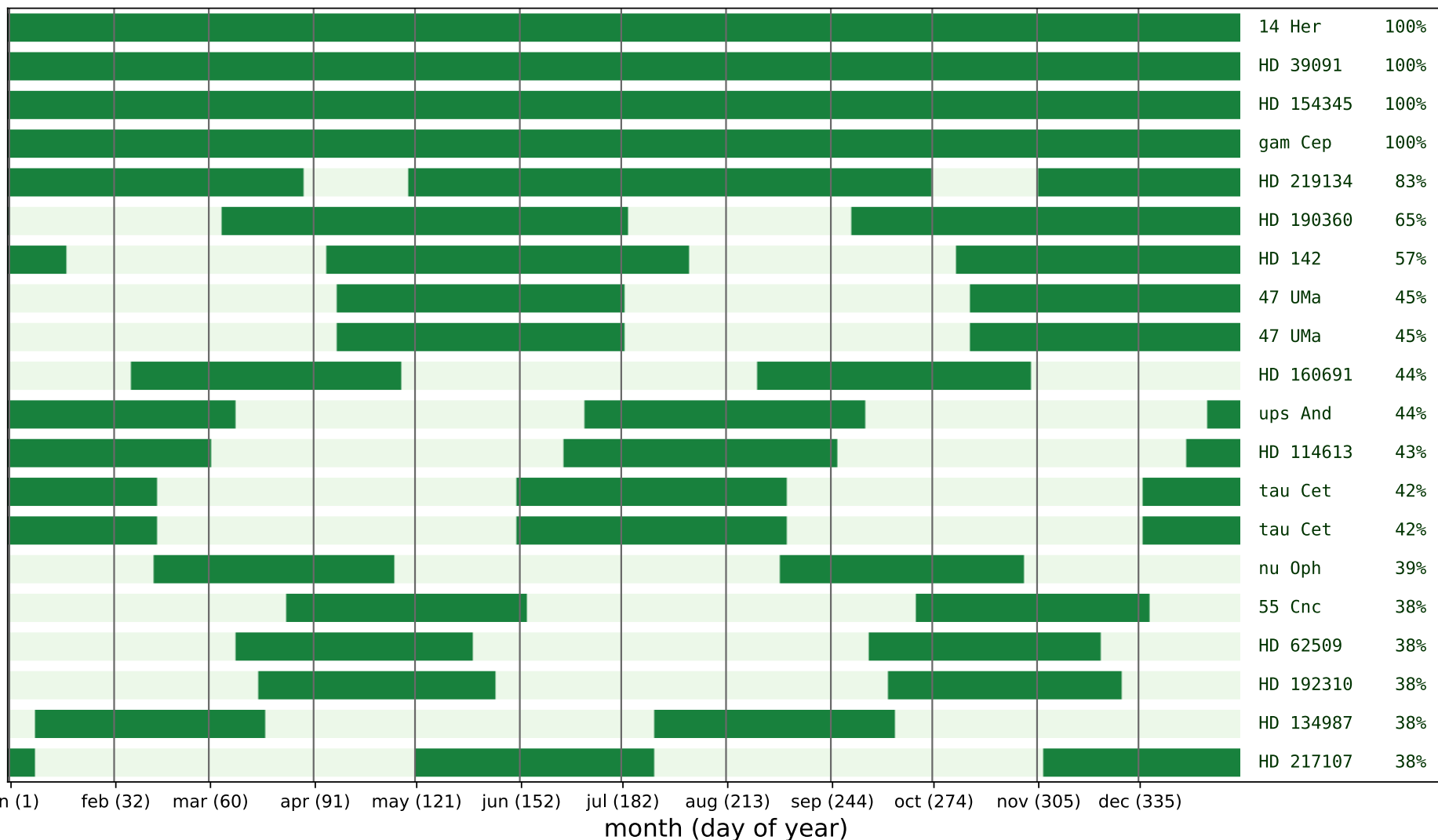
- Solar panel angle $< 34^\circ$
 - Slightly tighter constraint for CGI than WFI b/c CGI needs more power



Target Observability *not accounting for planet orbit*

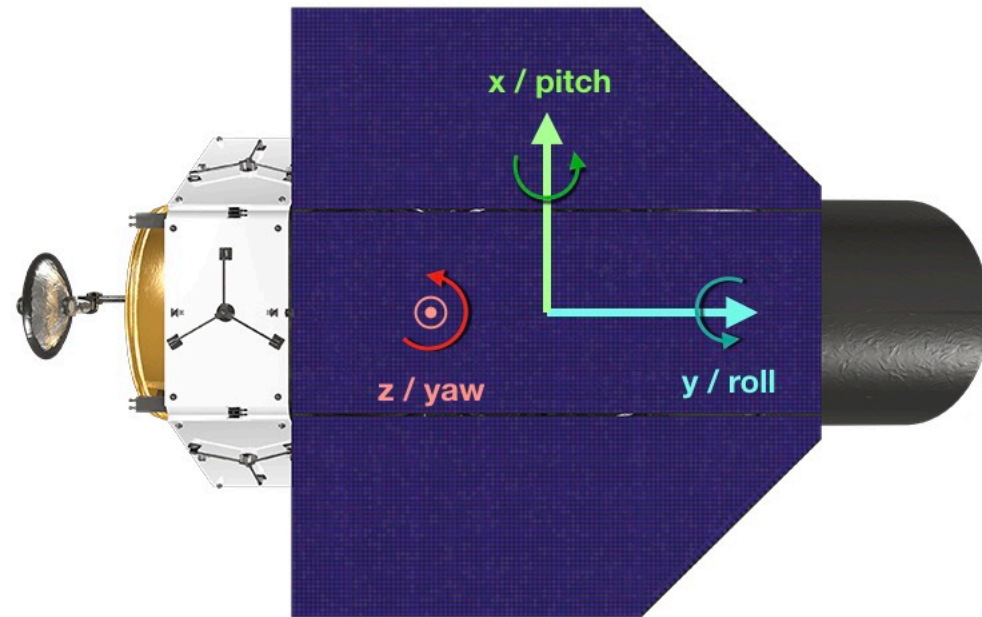


Target Observability *not accounting for planet orbit*

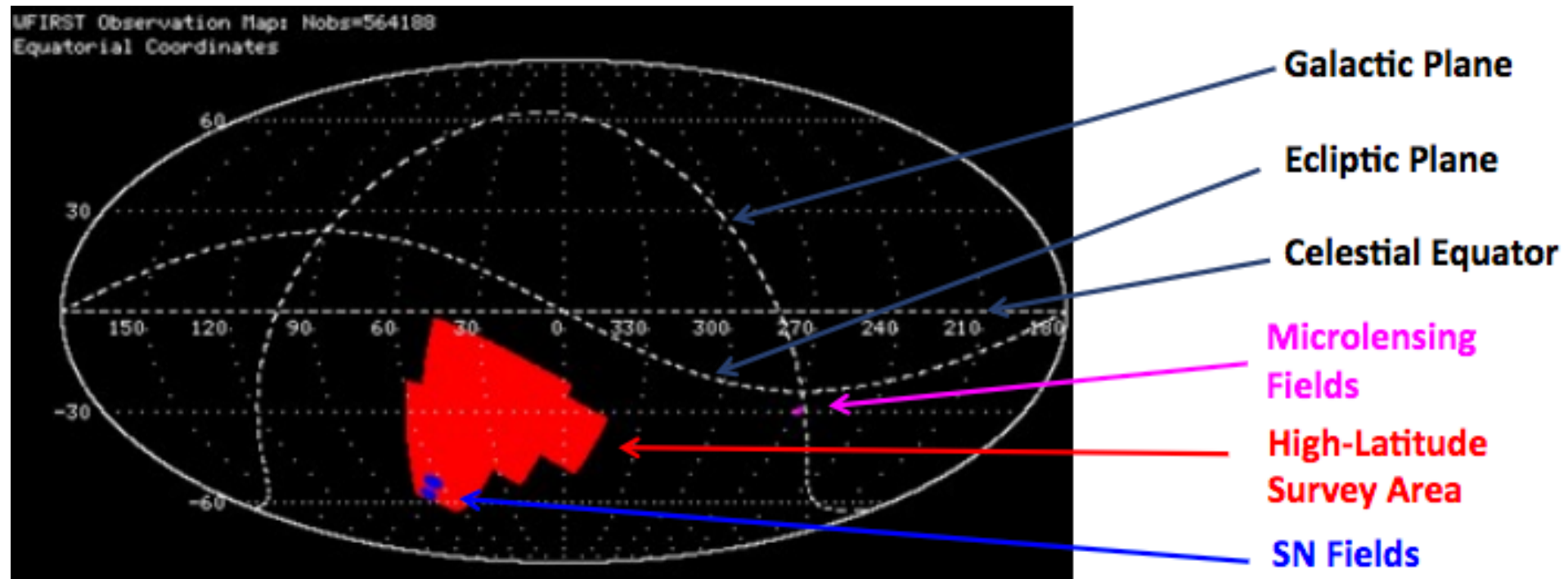


- Charley Noecker, Brian Kern, John Krist working on spacecraft integrated modeling (stability) defining next OS
- Preliminary thermal results:
 - pitch changes matter a lot
 - Smart choice of pitch/roll moves may minimize effects?
 - Need to think about where WFIRST is coming from...

moves are executed **yaw, pitch, roll** in that order

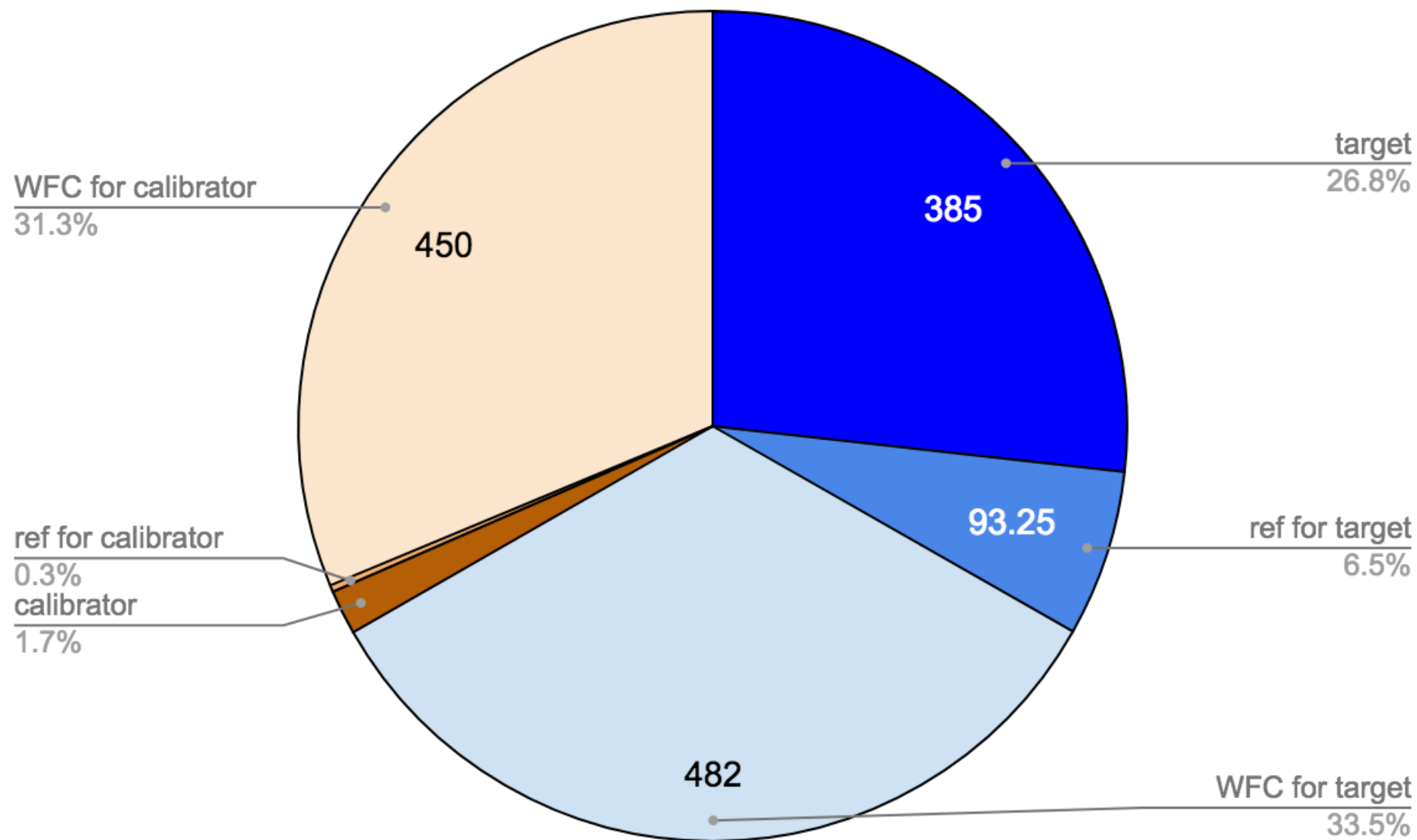


Body Centric Coordinate System (BCCS) zero point is
z pointed at Sun, x pointed to North Ecliptic Pole



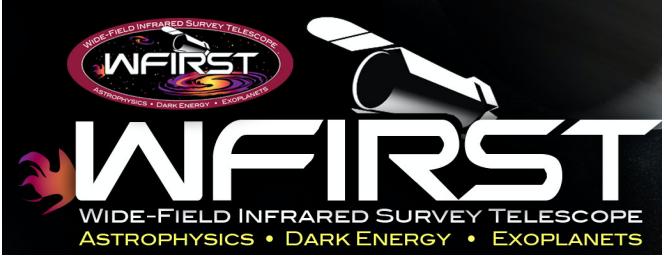
- 2200hr total for tech demo
- 100hr contingency time
- 30hr for spacecraft settling and dark hole digging
 - *Could this be shortened when observing bright companions or disks?*
- Exposure times calculated from The Spreadsheet using the “DRM” tab
- 8hr on target + 2hr on reference
 - *Is this the right ratio? Should it vary?*

- **requirements + predicted performance in ~1600hr**
- 2-3 RV planets imaged at 575nm
 - ~15 potential targets with $V < 6$
- Multiple options for disk imaging and polarimetry
- 1 reflected light RV planet spectrum
 - ups And d ~200hr but very near IWA. Very limited observing window: Aug/early Sept 2026. Must have good RV ephems!
 - HD 219134 h may be better option. $V=5.7$, but LOWFS probably OK. Much more observable, but in the galactic plane (crowded field!). Must have good pre-imaging!
- Adding top zodi targets is fast (~10hr integration each)



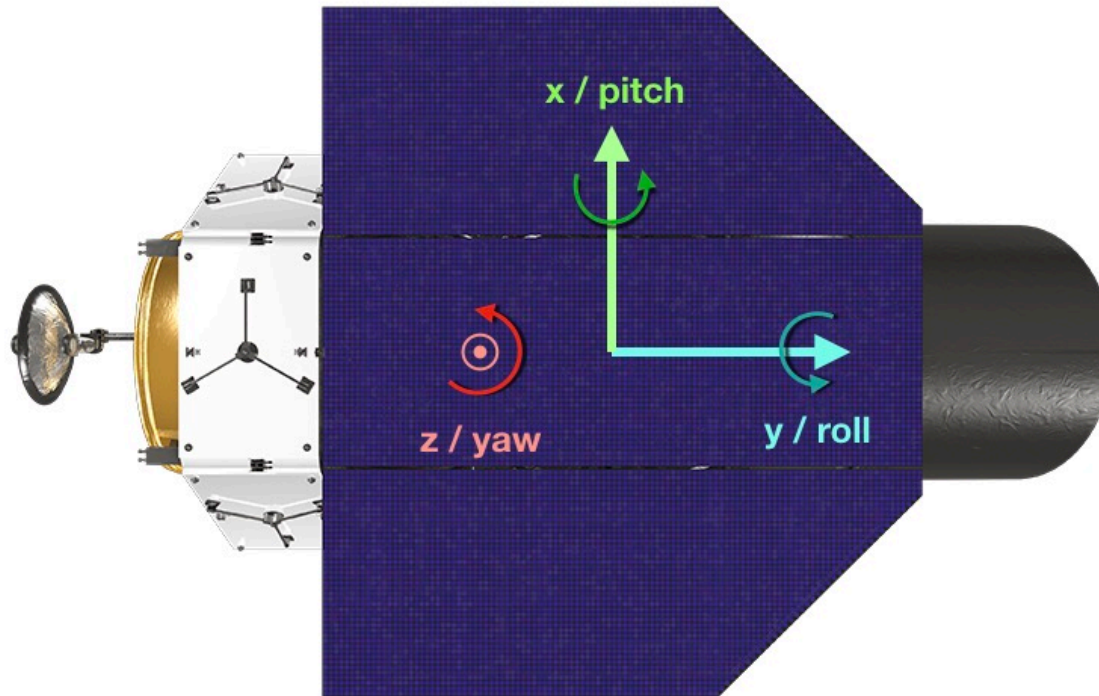
- Stellar properties (diameter, binaries, spectral type)
- current RV limits on other companions
- Predict local zodi background for each
- pick reference stars
- Debris disk predicted brightness
- ...

- Commissioning schedule
- Calibration schedule
- Scheduling tools
- Integration with WFI



Extra slides

moves are executed **yaw, pitch, roll** in that order



Body Centric Coordinate System (BCCS) zero point is
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- RV planet properties from The Imaging Mission Database
- 575nm imaging:
 - deltaMag at max separation
 - fsed=3
 - i=60 unless otherwise specified
- 760nm IFS:
 - Max separation for i=60, according to phase curve
 - deltaMag at quadrature
- To do: consideration of planet orbit phase in 2026

- Extrapolated from existing imaging
 - HR 4796 = IR imaging
 - HD 139664 = vis imaging of outer part of disk
- Exposure times were from best guess for SPC wide FOV performance. Has since been refined (initial estimate is close). Redo.

Initial setup must include:

- Health check
- Alignment check
- Initial nulling of 3 official modes
- IFS wavelength solution
- IFS and imaging plate scales
- IFS and imaging relative flux calibration

- Calibrations for astronomy
 - Astrometry, photometry, ...?
- Off-axis PSF characterization
- Polarimetric standards
- Photometric standards
- Spectral standards
- Extended source
- Snapshot survey of reference stars

1. Bright companion (TBD)
2. "Bright" reflected light planet
 1. ups And d; ~3hr + setup
 2. Sanity check & precursor for IFS
3. Faint reflected light planet
 1. 47 Uma c; ~30hr + setup
 2. Repeat 2x
4. Astrometric standard
 1. Repeat ??x over mission

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4	825	10%	HLC	3-9 λ/D	360°

These five coronagraph masks will be installed in CGI. However, only the three CGI configurations supporting the “official observing modes” will be fully tested for the tech demo phase.

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